

## **Sexual Anxiety and Female Sexual Arousal: A Comparison of Arousal During Sexual Anxiety Stimuli and Sexual Pleasure Stimuli**

**Vicki E. Beggs, Ph.D.,<sup>1,4</sup> Karen S. Calhoun, Ph.D.,<sup>2</sup>  
and Sharlene A. Wolchik, Ph.D.<sup>3</sup>**

---

*Sexual arousal occurring during sexual anxiety stimuli was compared to sexual arousal occurring during sexual pleasure stimuli in 19 sexually functional women. Stimuli were individualized narratives based on descriptions given by each subject. Sexual arousal was measured by monitoring vaginal blood flow with a vaginal photoplethysmograph. Results showed significant increases in vaginal blood flow in response to both sexual anxiety and sexual pleasure. However, increases in the pleasure condition were significantly greater than those in the anxiety condition. Analysis of the blood flow across time showed a significant linear increasing trend in the pleasure condition and a lack of such a trend in the anxiety condition.*

---

**KEY WORDS:** female sexual arousal; female sexual anxiety; vaginal blood flow.

### **INTRODUCTION**

Anxiety is considered to play a central role in the onset and maintenance of sexual dysfunctions (Kaplan, 1981; Masters and Johnson, 1970; Wolpe, 1958). Thus, anxiety reduction techniques are usually a

This study was based in part on a doctoral dissertation submitted by the first author to the University of Georgia. Parts of this study were presented at the 89th Annual meeting of the American Psychological Association, Los Angeles, California, August 1981.

<sup>1</sup>Harvard Community Health Plan, 111 Grossman Drive, Braintree, Massachusetts 02184.

<sup>2</sup>University of Georgia, Athens, Georgia.

<sup>3</sup>Arizona State University, Tempe, Arizona.

<sup>4</sup>To whom correspondence should be addressed.

primary component of treatments for sexual dysfunctions (cf. Barlow, 1986; Beck and Barlow, 1984). However, as Barlow (1986) noted, clinical inference rather than empirical data provides the basis for these etiological assumptions.

The results of several empirical investigations on the relation between anxiety and sexual arousal have challenged the notion that anxiety interferes with sexual arousal (e.g., Barlow *et al.*, 1983; Beck *et al.*, 1984; Hoon *et al.*, 1977; Wolchik *et al.*, 1980). For example, using a sample of sexually functional women, Hoon *et al.* (1977) reported that preexposure to a nonsexual anxiety-producing videotape resulted in greater sexual arousal during a subsequent erotic film than did preexposure to a neutral travelogue. Using the same preexposure paradigm, Wolchik *et al.* (1980) obtained similar results in a sample of sexually functional men.

In an effort to address the concern that the heightened sexual arousal observed by Hoon *et al.* (1977) and Wolchik *et al.* (1980) may have been due to "anxiety relief" (Wolpe, 1978), Barlow *et al.* (1983) employed a paradigm in which an anxiety-producing stimulus (shock threat) was presented simultaneously with an erotic film. Barlow *et al.* demonstrated that relative to a no-shock condition, shock threat contingent on tumescence, as well as noncontingent shock threat, increased sexual arousal in young sexually functional men.

However, results of more recent studies demonstrated that anxiety, as operationalized by shock threat, does not necessarily facilitate sexual arousal. For example, Beck *et al.* (1984) reported that sexually functional men responded to noncontingent shock threat with increased sexual arousal, whereas contingent shock threat did not increase sexual arousal above levels in the no-shock condition. Further, shock threat produced significantly less arousal than did a no-shock control condition in sexually dysfunctional men. Using sexually functional men, Beck *et al.* (in press), demonstrated that various levels of anxiety produced by contingent shock threat affected tumescence differently, with moderate levels of anxiety leading to decrements in arousal whereas tumescence was unaffected during intense anxiety.

Thus, the relationship between anxiety and sexual arousal appears to be a complex one that is influenced by subject characteristics such as sexual history as well as contextual factors such as intensity of the anxiety stimulus. One important aspect of the context of anxiety concerns the content of the anxiety stimuli. To date, researchers have not examined the impact of anxiety stimuli that involve sexual content on sexual arousal. Nor have researchers studied how the pattern of arousal during sexual anxiety stimuli may differ from arousal during sexually pleasurable stimuli. The present study compared the intensity and pattern of physiological sexual

arousal occurring during individually validated sexual anxiety stimuli to that occurring during individually validated sexual pleasure stimuli in sexually functional women.

## METHOD

### Subjects

Subjects were 19 female volunteers between the ages of 18 and 30 years (mean = 20.8) who were recruited through newspaper announcements and a psychology department undergraduate research participant pool. None complained of sexual dysfunction in a screening interview. All were orgasmic except for two. Their mean score was 17.4 on the Bentler (1968) Heterosexual Behavior Inventory.

### Experimental Design

A within-subject repeated measures design was used in which each subject was exposed to each experimental condition. The two experimental conditions were sexual anxiety and sexual pleasure. A neutral control condition was unnecessary because validation studies of the vaginal photoplethysmograph (Geer *et al.*, 1974; Heiman, 1977; Hoon *et al.*, 1976) have shown significant responses to erotic stimuli and lack of significant responses to neutral control and dysphoric control stimuli. The order of experimental conditions was randomly assigned. A flexible length return to baseline period followed each experimental condition.

### Physiological Measures

Change in vaginal blood flow, as indicated by blood volume pulse (BVP) amplitude, was measured by a vaginal photoplethysmograph with an incandescent light source (DL 1088) and a cadmium selenide photoresistor (CI 904LO) which was designed by Sintchak and Geer (1975). Although the light history effects of this photoresistor are minimal in the a-c mode used to record BVP (Novelly *et al.*, 1973), light history and heating effects were further minimized by a 15-min adaptation period after the photoplethysmograph was inserted, before the experiment began. The BVP measure was chosen because previous vaginal photoplethysmograph studies comparing BVP to blood volume (BV) have found BVP to be the more sen-

sitive measure of sexual arousal (Geer *et al.*, 1974; Heiman, 1977; Osborn and Pollack, 1977). Continuous BVP recordings from the photoplethysmograph were monitored with a Grass Model 7 P5A preamplifier.

### Stimuli

Stimuli were 100-sec narratives from each subject's verbatim report of a sexual anxiety experience or fantasy (sexual anxiety condition) and a pleasurable sexual experience or fantasy (sexual pleasure condition), elicited during the presession interview. After reporting her sexual anxiety experience or fantasy, each subject rated the intensity of her subjective anxiety on a scale from 1 to 7. If she rated the experience less than 6, changes were incorporated that intensified her distress to a rating of 6 or 7. The same procedure was followed in developing the pleasurable sexual experiences.

Examination of the content of the stimuli revealed several differences across the anxiety and pleasurable conditions. Explicit sexual acts such as hugging, kissing, breast stimulation, manual and oral genital stimulation, and intercourse were present in all stimuli, with heterosexual intercourse occurring in 60% of the pleasurable stimuli and 55% of the anxiety stimuli. Sexual arousal was described in 90% of the pleasurable stimuli and only 50% of the anxiety stimuli, whereas a lack of sexual arousal was described in 30% of the anxiety stimuli but none of the pleasure stimuli. Other descriptors that occurred in the anxiety condition but *not* in the pleasurable conditions were hurried timing (60%), negative affect such as anxiety, disgust, anger, disappointment (95%), lack of control over the situation (65%), physical pain (20%), unattractiveness of the partner (25%), absence of a previous relationship with the partner (20%), and lack of privacy (40%). Mention of slow timing of sexual activities (60%) and positive experiences with alcohol (40%) were mentioned only in pleasurable condition. Finally, comments about positive aspects of the atmosphere and about the attractiveness of the partner occurred often in the pleasurable condition but not the anxiety condition (80 vs. 20% and 75 vs. 35%, respectively).

### Procedure

#### *Interview*

The purpose and procedures were explained, and subjects gave informed consent. Subjects were interviewed individually by a female in-

vestigator to obtain a sexual history and descriptions of scenes from their own experiences or fantasies which elicited anxiety and sexual arousal.

### *Experimental Session*

Subjects participated singly and inserted the sterilized vaginal photoplethysmograph in private. After each experimental condition, subjects rated their anxiety and sexual arousal during the stimulus presentation on 7-point scales.

### **Data Sampling**

During the last minute preceding the onset of each stimulus presentation and the entire 100 sec of the stimulus presentation, BVP amplitude was measured each second for the first 4 sec of each 20-sec time block. The means of each of the 4-sec time blocks sampled preceding the experimental stimulus were averaged to obtain a baseline BVP amplitude. The means of the four 4-sec time blocks sampled during the last 90 sec of the experimental stimulus were averaged to obtain an experimental stimulus amplitude.

## **RESULTS**

### **Analyses of Subjective Ratings**

Two by two (order of stimulus presentation  $\times$  experimental stimulus) analyses of variance with repeated measures on the experimental stimulus factor for subjects' self-ratings of sexual arousal and anxiety following each stimulus presentation yielded significant effects for the experimental stimulus. Subjects rated the sexual pleasure condition as significantly more sexually arousing than the sexual anxiety condition,  $F(1, 17) = 33.111, p < 0.0001$ , and the sexual anxiety condition as significantly more anxiety arousing than the sexual pleasure condition,  $F(1, 17) = 23.390, p < 0.001$ .

### **Analyses of BVP Amplitude**

#### *BVP Amplitude Across Baseline and Experimental Conditions*

A  $2 \times 2 \times 2$  (order of stimulus presentation  $\times$  experimental stimulus  $\times$  time of measurement, with times being baseline and experimental condi-

tions) analysis of variance with repeated measures on the last two factors was completed for BVP amplitude. It yielded significant effects for time,  $F(1, 17) = 24.799$ ,  $p < 0.0001$ , and the interaction between experimental stimulus and time,  $F(1, 17) = 4.783$ ,  $p < 0.05$ .

To assess each experimental stimulus condition for significant time main effects, separate  $1 \times 2$  (experimental stimulus  $\times$  time of measurement) analyses of variance were computed for each experimental stimulus condition. Both the sexual pleasure and the sexual anxiety conditions yielded significant main effects for time such that BVP amplitude increased significantly above baseline during the experimental stimulus presentation,  $F(1, 18) = 23.546$ ,  $p < 0.001$ , for pleasure; and  $F(1, 18) = 6.976$ ,  $p < .05$ , for anxiety. Significant positive correlations between baseline BVP amplitude and experimental stimulus amplitude necessitated using analyses of covariance in the subsequent comparisons of experimental effects.

### *Maximum BVP Amplitude*

A  $2 \times 2$  (order of stimulus presentation  $\times$  experimental stimulus) analysis of covariance with repeated measures on the latter factor was computed for the BVP maximum average amplitude during each stimulus presentation. This analysis yielded a significant covariate effect,  $F(1, 16) = 28.607$ ,  $p < 0.001$ , and a significant main effect for experimental stimulus with sexual pleasure producing significantly greater BVP amplitude than sexual anxiety,  $F(1, 16) = 5.645$ ,  $p < 0.05$ . Because neither order of presentation nor the interaction between order and experimental stimulus were significant, order of stimulus presentation was dropped from subsequent analyses.

### *BVP Amplitude Across Time*

Further analyses using all five BVP average amplitude measures sampled every 20 sec throughout each 100-sec stimulus presentation were conducted to examine patterns of arousal during each experimental stimulus. A  $2 \times 5$  (experimental stimulus  $\times$  time) analysis of covariance with repeated measures on both factors and with orthogonal decomposition of time effects revealed significant effects for the covariate,  $F(1, 17) = 64.694$ ,  $p < 0.01$ ; time,  $F(4, 72) = 3.519$ ,  $p < 0.01$ ; and a linear time  $\times$  experimental stimulus interaction,  $F(1, 18) = 4.288$ ,  $p < 0.05$ . Subsequent separate  $1 \times 5$  (experimental stimulus  $\times$  time) analyses covariance for each experimental stimulus revealed a significant linear trend for time in the sexual pleasure stimulus condition,  $F(1, 18) = 8.403$ ,  $p < 0.01$ , and no significant time effect in the sexual anxiety stimulus condition.

## DISCUSSION

While both sexual pleasure and sexual anxiety stimuli produced significant sexual arousal relative to baseline levels, sexual pleasure stimuli produced significantly greater sexual arousal than did sexual anxiety stimuli. The sexual pleasure condition produced a significant linear increase in arousal over time while the sexual anxiety condition did not. Thus, the sexual arousal produced by sexual anxiety and sexual pleasure stimuli differed significantly in both magnitude and pattern.

The present sexual anxiety condition can be viewed as an analog of a sexual situation in which a woman experiences anxiety and some sexual arousal, but the sexual arousal is significantly lower than that in a nonanxious situation. As the present study demonstrates, lowered physiological arousal is associated with decreased subjective sexual arousal. Furthermore, the lack of a significant linear increase in BVP amplitude over time would result in a woman failing to reach the plateau stage of sexual response and not achieving orgasm.

The present findings highlight the importance of contextual factors in understanding the relation between anxiety and sexual arousal. Unlike results of previous research which have demonstrated that anxiety can facilitate sexual arousal in sexually functional men (Barlow *et al.*, 1983; Beck *et al.*, 1984; Wolchik *et al.*, 1980) and women (Hoon *et al.*, 1977), our findings provide support for the prominent role that anxiety has been given in theoretical formulations of sexual dysfunction.

How can these discrepant findings be explained? It is important to note that whereas nearly all the anxiety stimuli in studies showing a facilitative effect have been nonsexual in content,<sup>5</sup> the anxiety-producing stimuli in the present study were sexual in content. "Excitation transfer" theory (Schacter, 1964) provides a conceptual framework that may be useful in speculating about these varied relations between anxiety and sexual arousal. According to this theory, when the context for heightened physiological arousal is not readily apparent, the individual relies on the current context to generate an appropriate label for these feelings. Faced with anxiety created by nonsexual stimuli when viewing a sexually explicit film, the individual may mislabel the anxiety as sexual arousal which may lead to heightened sexual arousal. However, when the source of the anxiety is clear (i.e., the anxiety-producing stimuli are sexual in nature or the anxie-

<sup>5</sup>It should be noted that Barlow *et al.* (1983) employed an anxiety stimulus that was sexual in content (i.e., shock threat contingent on inadequate sexual arousal) and obtained a facilitative effect in sexually functional men. However, the generalizability of these results is questionable given that neither Beck and Barlow (1986) nor Beck *et al.* (in press) replicated this arousal-enhancing effect of sexually relevant anxiety stimuli (contingent shock) in their samples of sexually functional men.

ty is related to adequate sexual performance as in a contingent shock threat condition), a facilitative effect of anxiety does not occur. Research comparing the impact of sexual vs. nonsexual anxiety producing stimuli on sexual arousal as well as research comparing the responses of sexually functional and sexually dysfunctional women in these conditions would be useful. Given the cautions about the generalizability of findings based on small samples such as the current one, efforts to replicate the present results are clearly warranted.

In concert with findings of other researchers, the present data illustrate that conclusions about the relations between anxiety and sexual arousal vary as a function of contextual and historical variables. Examination of other contextual and individual factors that influence whether anxiety facilitates or hinders sexual arousal will have both clinical and theoretical implications. Another issue for future research concerns the cognitive, affective, and/or physiological mechanisms through which anxiety exerts its influence on sexual arousal.

### ACKNOWLEDGMENTS

The authors thank Joyce Smith and Kim Morris for their help with data reduction and scoring. Also, the authors thank Judy Sarrett for her typing.

### REFERENCES

- Barlow, D. H. (1986). Causes of sexual dysfunction: The role of anxiety and cognitive interference. *J. Consult. Clin. Psychol.* 54: 140-148.
- Barlow, D. H., Sakheim, D. K., and Beck, J. G. (1983). Anxiety increases sexual arousal. *J. Abnor. Psychol.* 92: 49-54.
- Beck, J. G., and Barlow, D. H. (1984). Current conceptualizations of sexual dysfunction: A review and an alternative perspective. *Clin. Psychol. Rev.* 4: 363-378.
- Beck, J. G., and Barlow, D. H. (1986). The effects of anxiety and attentional focus on sexual responding. I: Physiological patterns in erectile dysfunction. *Behav. Res. Ther.* 24: 9-17.
- Beck, J. G., Barlow, D. H., Sakheim, D. K., and Abrahamson, D. J. (1984). Sexual responding during anxiety: Clinical versus nonclinical patterns. Paper presented at the 18th annual convention of the Association for the Advancement of Behavior Therapy, Philadelphia.
- Beck, J. G., Barlow, D. H., Sakheim, D. K., and Abrahamson, D. J. (in press). Shock threat and sexual arousal: The role of selective attention, thought content, and affective state. *Psychophysiology*.
- Bentler, P. (1968). Heterosexual behavior assessment-II. Females. *Behav. Res. Ther.* 6: 27-30.



- Geer, J. H., Morokoff, P., and Greenwood, P. (1974). Sexual arousal in women: The development of a measurement device for vaginal blood flow. *Arch. Sex. Behav.* 3: 559-564.
- Heiman, J. R. (1977). A psychophysiological exploration of sexual arousal patterns in females and males. *Psychophysiology* 14: 266-274.
- Hoon, P. W., Wincze, J. P., and Hoon, E. F. (1976). Physiological assessment of sexual arousal in women. *Psychophysiology* 13: 196-204.
- Hoon, P. W., Wincze, J. P., and Hoon, E. F. (1977). A test of reciprocal inhibition: Are anxiety and sexual arousal in women mutually inhibitory? *J. Abno. Psychol.* 86: 65-74.
- Kaplan, H. S. (1981). *The New Sex Therapy: Active Treatment of Sexual Dysfunctions*, Brunner/Mazel, New York.
- Masters, W. H., and Johnson, V. E. (1970). *Human Sexual Inadequacy*, Little Brown, Boston.
- Novelly, R. A., Perona, P. J., and Ax, A. F. (1973). Photoplethysmography: System calibration and light history effects. *Psychophysiology* 10: 67-73.
- Osborn, C. A., and Pollack, R. H. (1977). The effects of two types of erotic literature on physiological and verbal measures of female sexual arousal. *J. Sex. Res.* 13: 250-256.
- Schacter, S. (1964). The interaction of cognitive and physiological determinants of emotional states. In Berkowitz, L. (ed.), *Advances in Experimental Social Psychology*, Vol. 1, Academic Press, New York.
- Sintchak, G., and Geer, J. H. (1975). A vaginal plethysmograph system. *Psychophysiology* 12: 113-115.
- Wolchik, S. A., Beggs, V. E., Wincze, J. P., Sakhein, D. K., Barlow, D. H., and Mavis-sakalian, M. (1980). The effects of emotional arousal on subsequent sexual arousal in men. *J. Abnorm. Psychol.* 89: 595-598.
- Wolpe, J. (1978). Comments on "A test of reciprocal inhibition" by Hoon, Wincze, and Hoon. *J. Abnorm. Psychol.* 87: 452-454.